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16 Sept. 1963

MEMORANDUM FOR : Special Assistant for Liason, OSA

SUBJECT : Status of Laser Weapons Against the CORONA and OXCART Programs

Reference : Memorandum for DD/S&T from Special Assistant for Liason, OSA, Dated 11 Feb. 1963
Subject: The special affect of lazers on the CORONA and OXCART Programs.

Reference B : Article entitled "Lasers Optics Encountering Deterioration Problems" Missiles and Rockets, Sept. 9, 1963, page 27.

1. This memorandum offers some comments on Ref. A based primarily on information developed in Ref. B.

2. Ref. A discusses the possibility of laser weapons used against the CORONA or OXCART vehicles. In particular, the possible damage to the camera lens by interception of such a weapon is noted. The Missiles and Rockets article notes damage to optical equipment within laser systems. Two points are worth noting with regard to this. First, the damage to the laser systems themselves operating at high-power outputs are apparently going to provide some limitation and force the development of a long-range laser weapon further into the future. Secondly, the damage noted was at very high density of energy and power. Damage was extremely localized within the lens at points of focus of the system when illuminated almost directly by the full power.

3. In evaluation of a laser weapon damage to the OXCART or the CORONA cameras, the following numbers can be used. First, any impact on the CORONA system will be down by factor of at least 30 below that for the OXCART because of rouse factors. Thus, the primary problem will be with regard to the OXCART camera. Second, with proposed future powers and beam angles of the laser weapon (one hundred joules, 50 megawatts, and 10 micro-radian beam width)

the input to the front surface of the lens, at 100,000 feet range, would be approximately 0.03 gram-calories per square centimeter. This energy deposition is on the very low end of potential damage to optical surfaces wherein the energy is deposited in a thin layer. With energy deposition along the lens systems one would not expect any damage to the lens. At the focal plane, some damage might occur where energy densities of greater magnitude are incident. These weapon parameters postulated above are only in proposal stages. The current state-of-the-art, as noted in the article, is down by a factor of about twenty-million. Even allowing for some lack of information by the author it would appear that powers considerably below what are needed are available currently. Further, the article, in its discussion on failures in equipment and troubles, strongly implies that the generation of the powers and strengths needed cannot be done at the present time without considerable advance in the state-of-the-art of manufacture of materials with extremely high electric field strengths for use in the laser system.

The tracking accuracy necessary for the direct hit with a 10 micro-radian beam width would be of the same order of magnitude; thus, one would need track accuracy at or beyond the state-of-the-art. Weapon beam spreading, needed for a less accurate tracking, would reduce significantly energy densities available.

It may still be useful to implement the laser application as a cover story. The laser weapon as a part of defensive system for the OXCART might be possible. The usefulness of lasers as radar systems are not involved in the above discussion and they do present some possible future danger to systems of ours.

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